THE INADEQUACIES OF THE 1997 CONVENTION ON INTERNATIONAL WATER COURSES AND 2008 DRAFT ARTICLES ON THE LAW OF TRANSBOUNDARY AQUIFERS

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I. INTRODUCTION

Nothing can survive without water; it is essential to both plant and animal life.[1] For humans, water is not only crucial to survival,[2] but it is also a versatile piece of daily life used for cooking, cleaning, irrigation, waste disposal, power production, and recreation.[3]

Freshwater is a precious resource,[4] and its value is especially clear given its relative scarcity.[5] Though water is abundant on Earth, most of it cannot be used for basic human

1. Missouri v. Illinois, 180 U.S. 208, 210 (1901) (referring to water as "indispensible to . . . life and health"); *see* Chad A. West, *For Body, Soul, or Wealth: The Distinction, Evolution, and Policy Implications of a Water Ethic*, 26 STAN. ENVTL. L.J. 201, 208 (2007) ("[W]ater is a building block of existence, possessing both the power to give and destroy life.").

2. *See* Sophia Asare, Comment, *"This Land Cannot Die": U.S. Involvement in the Rebuilding of Haiti*, 33 HOUS. J. INT'L L. 177, 210 (2010) (citing U.N. High Comm'r for Refugees, Guiding Principles on Internal Displacement, Principle 18, U.N. Doc. E/CN.4/1998/53/Add.2 *available at* http://www.brookings.edu/fp/projects/idp/resources/GPEnglish.pdf).

3. STEPHEN MCCAFFREY, THE LAW OF INTERNATIONAL WATERCOURSES 3–4 (2d ed. 2007) [hereinafter INTERNATIONAL WATERCOURSES].

4. Martin Lythgoe, *Renewable Generation in Argentina: Past Failures and a Plan for Future Success*, 31 HOUS. J. INT'L L. 263, 305 (2009).

5. *See* Peter Bowal, *Canadian Water: Constitution, Policy, and Trade*, 2006 MICH. ST. L. REV. 1141, 1145 (2006).

needs—drinking, cooking, and cleaning—because more than 97% of Earth's water is saltwater.[6] This leaves only about 2.5% as freshwater.[7] Of this freshwater, more than 70% is frozen as ice or permanent snow in mountainous regions.[8] A small part of the remaining 30% of freshwater is found in streams and lakes, but the lion's share lies under the ground as groundwater.[9] So, only 2.5% of Earth's water is freshwater and less than 1% of that amount is available as surface water for humans and ecosystems.[10] In that context, it becomes apparent that usable freshwater is precious indeed.[11]

The rapid growth of communities, combined with increased international trade, has resulted in a growing demand for freshwater.[12] U.N. estimates indicate that, over the last century, global water use has grown more than twice as quickly as the world's population.[13] But, while the demand for freshwater has grown, the quantity of surface water has remained the same.[14] This has led to heightened competition for groundwater sources.[15]

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6. *Id.*; *see* UN-–WATER STATISTICS: GRAPHS & MAPS, WATER RESOURCES, http://www.unwater.org/statistics_res.html (last visited Nov. 21, 2010).

7. UN-–WATER STATISTICS: GRAPHS & MAPS, WATER RESOURCES, *supra* note 6.

8. *Id.*

9. *Id.*

10. *Id.*

11. *See, e.g.* Thaddeus Baria, Comment, *Up the Creek with a Paddle: Water Doctrine as a Basis for Small Wind Energy Resource Rights*, 59 DEPAUL L. REV. 141, 163 (2009) ("Arguably, mankind's most valuable resource is water."); John Gray, Comment, *Choosing the Nuclear Option: The Case for a Strong Regulatory Response to Encourage Nuclear Energy Development*, 41 ARIZ. ST. L.J. 315, 330 (2009) (referring to usable water as "perhaps the only resource more precious than oil and gas").

12. INT'L HYDROLOGICAL PROGRAMME, INTERNATIONALLY SHARED (TRANSBOUNDARY) AQUIFER RESOURCE MANAGEMENT: THEIR SIGNIFICANCE AND SUSTAINABLE MANAGEMENT 25 (2001), http://unesdoc.unesco.org/images/0012/001243/124386e.pdf [hereinafter ISARM].

13. U.N. FOOD & AGRIC. ORG., COPING WITH WATER SCARCITY: CHALLENGE OF THE TWENTY-FIRST CENTURY 10 (2007), *available at* http://www.fao.org/nr/water/docs/escarcity.pdf.

14. Stephen C. McCaffrey, *A Human Right to Water: Domestic and International Complications*, 5 GEO. INT'L ENVTL. L. REV. 1, 3 (1992) [hereinafter *A Human Right to Water*]; *see* Owen L. Anderson, *Introduction to the 2007 Energy Issue*, 29 HOUS. J. INT'L L. 271, 276 (2007).

15. *A Human Right to Water*, *supra* note 14, at 2; *see also* ISARM, *supra* note 12, at

Signs of the effects of this growing competition include the declining water levels in aquifers, decreased water pressure in aquifers, and poor water quality.[16] As it stands, 884 million people in the world lack access to enough freshwater to satisfy basic needs like drinking, cooking, and cleaning,[17] and 2.6 billion people do not have access to basic sanitation.[18] Experts predict that, if the demand for water continues to increase, we can expect about half of the planet's people to live in water-deprived countries in the near future.[19]

These staggering numbers demonstrate the need for governments to ensure proper water management.[20] The need for organized action is even more critical for transboundary groundwater reserves situated "across a boundary line between two or more countries."[21] With no international law clearly governing freshwater, states would be tempted to completely exploit groundwater without considering the needs of other

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16. ISARM, *supra* note 12, at 25.

17. *See* WORLD HEALTH ORG. & UNICEF, PROGRESS ON SANITATION AND DRINKING-WATER: 2010 UPDATE 7 (2010), http://www.wssinfo.org/fileadmin/user_upload/resources/1278061137-JMP_report_2010_en.pdf [hereinafter PROGRESS ON SANITATION AND DRINKING-WATER]; *see also* Thomas Pogge, *Keynote Address: Poverty, Climate Change, and Overpopulation*, 38 GA. J. INT'L & COMP. L. 525, 526 (2010).

18. *See* PROGRESS ON SANITATION AND DRINKING-WATER, *supra* note 17, at 6; *see also* Lawrence O. Gostin, *Meeting Basic Survival Needs of the World's Least Healthy People: Toward a Framework Convention on Global Health*, 96 GEO. L.J. 331, 369 (2008).

19. INTERNATIONAL WATERCOURSES, *supra* note 3, at ix; *see* PROGRESS ON SANITATION AND DRINKING-WATER, *supra* note 17, at 31.

20. *See* James A. Frederick, Comment, *Thou Shall Not Covet Thy Neighbor's Water: A Look at the Journey Both Texas and the Middle East Must Embark upon to Solve the Kinks in Their Water Regulation*, 29 HOUS. J. INT'L L. 423, 424 (2007) ("After looking at the insufficient water regulations of Texas and countries in the Middle East, it becomes clear that both areas will need to undergo a massive overhaul in water regulations to ensure they preserve access to water.").

21. Karla Urdaneta, *Transboundary Petroleum Reservoirs: A Recommended Approach for the United States and Mexico in the Deepwaters of the Gulf of Mexico*, 32 HOUS. J. INT'L L. 333, 338–39 (2010); *see* Fadia Daibes, *A Progressive Multidisciplinary Approach for Resolving the Palestinian-Israel Conflict over the Shared Technology Groundwater: What Lessons Learned from International Law?*, 8 U. DENV. WATER L. REV. 93, 143 (2004) (noting that modern development in transboundary groundwater demonstrates "the risks from uncontrolled use of groundwaters that cross borders between two or more states").

states, which may depend heavily on those shared reserves.[22] Despite the critical need to regulate the use of groundwater, governments and non-governmental organizations have largely ignored this topic.[23] In the absence of solid policy considerations and clear direction, legal principles related to groundwater have been "rather crude." [24]

This Comment examines the existing legal principles about shared groundwater and the particularly heightened protections that should apply. It examines the application of the 1997 U.N. Convention on the Non-Navigational Uses of International Watercourses[25] (the "1997 Convention" or "Convention") and the 2008 Draft Articles on the Law of Transboundary Aquifers[26] (the "2008 Draft Articles" or "Draft Articles"). Although they are not binding law, these instruments are relevant and important to the international community because they serve as models for state agreements on water resources.[27]

Part I of this Comment provides an overview of the hydrogeology of groundwater and its function in the hydrological cycle. Part II reviews the precursors to the 1997 Convention and introduces that instrument and the 2008 Draft Articles. In Part III, this Comment examines the scope of these instruments in terms of their application to groundwater and discusses the potential effects of the 2008 Draft Articles on the 1997 Convention. Parts IV and V each examine and critique one of

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22. *See* Mohammed S. Helal, *Sharing Blue Gold: The 1997 U.N. Convention of the Law of the Non-Navigational Uses of International Watercourses Ten Years On*, 18 COLO. J. INT'L ENVTL. L. & POL'Y 337, 337–38 (2007) (noting various interpretations of the regulatory effect of the 1997 U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses).

23. INTERNATIONAL WATERCOURSES, *supra* note 3, at 482 (noting that groundwater has been "out of sight and out of mind" for states, international organizations, and academics).

24. *See id.*

25. Convention on the Law of the Non-Navigational Uses of International Watercourses, G.A. Res. 51/229, U.N. Doc. A/RES/51/229 (May 21, 1997) [hereinafter 1997 Convention].

26. Draft Articles on the Law of Transboundary Aquifers, *in* Rep. of the Int'l Law Comm'n, 60th sess, May 5–June 6, July 7–Aug. 8, 2008, at 19–27 U.N. Doc. A/63/10; GAOR, 63d Sess., Supp. No. 10 (2008) [hereinafter 2008 Draft Articles].

27. Nora R. Pincus, *Groundwater and International Law: The Need for Specific Regulation*, 11 U. DENV. WATER L. REV. 313, 315 (2008).

the two main principles embodied in these instruments: (1) equitable and reasonable utilization and (2) the duty to cause no harm. Finally, this Comment proposes how these principles may be strengthened to better provide for groundwater's protection from overuse and pollution.

II. BASIC HYDROGEOLOGY

A. Groundwater

As a term, "groundwater" gives the impression that it applies to all water located below the Earth's surface.[28] This is not entirely accurate.[29] In the hydrogeological context, a slightly narrower definition is more appropriate: "Groundwater" encompasses all water below the water table.[30] The water table is the level under the Earth's surface where the soil is completely saturated with water.[31] Therefore, "groundwater" does not include the water percolating downward through the Earth's subsurface at any given time.[32] Instead, it is limited to the water that has already seeped downward as far as possible and can go no further because the earth beneath it is completely

28. *See, e.g.* Dean Baxtresser, Note, *Antiques Roadshow: The Common Law and the Coming Age of Groundwater Marketing*, 108 MICH. L. REV. 773, 774 n.2 (2010) ("'[G]roundwater' is defined as any water underneath the surface of the earth."); Chris Connelley, Comment, *The Inconvenience in Texas Groundwater Law*, 46 HOUS. L. REV. 1301, 1301 n.1 (2009) (defining groundwater as "water 'percolating below the surface of the earth.'") (quoting Tex. Water Code Ann. §36.001(5) (West 2008)).

29. *See* Gabriel Eckstein & Yoram Eckstein, *A Hydrogeological Approach to Transboundary Ground Water Resources and International Law*, 19 AM. U. INT'L L. REV. 201, 208–09 (2003) [hereinafter *A Hydrogeological Approach*].

30. *Id.*; *see* Tracy J. Logan, Comment, *Carbon Down Under—Lessons from Australia: Two Recommendations for Clarifying Subsurface Property Rights to Facilitate Onshore Geologic Carbon Sequestration in the United States*, 11 SAN DIEGO INT'L L.J. 561, 589 (2010) (defining groundwater as "all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water which flows in known and definite channels") (quoting Cal. Water Code § 10752(a) (West 2009)).

31. James W. Hayman, Comment, *Regulating Point-Source Discharges to Groundwater Hydrologically Connected to Navigable Waters: An Unresolved Question of Environmental Protection Agency Authority Under the Clean Water Act*, 5 BARRY L. REV. 95, 121 (2005); *A Hydrogeological Approach*, *supra* note 29, at 209–10.

32. *A Hydrogeological Approach*, *supra* note 29, at 208.

saturated.[33] This does not occur at a fixed depth across the globe; instead, the depth of a local water table—and thus any local groundwater—is determined by local conditions.[34] Likewise, groundwater "respects no political boundary."[35] As a result, "with the exception of remote islands, almost all states share groundwater resources with at least one neighbor."[36] This shared groundwater exists in transboundary aquifers, some of which are large enough to span across several international borders.[37]

B. Hydrologic Cycle

The hydrologic cycle "has no beginning and no end."[38] It is the constant and never-ending process by which water moves from the atmosphere downward to the earth's surface and back up to the atmosphere.[39] Water falls from the atmosphere to the Earth as precipitation and returns to the atmosphere either by being heated and evaporated directly into the air, or by being absorbed by plants and transpired through their leaves.[40] The water that does not immediately return to the atmosphere or flow into bodies of surface water (streams, ponds, and lakes)

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33. *See id.* at 208 ("Water typically percolates into the earth vertically down until it reaches the ground water table, where it flows in a more lateral direction through the porous spaces in the geologic formation.").

34. *See* Jenny Huang, *Finding Flow: The Need for a Dynamic Approach to Water Allocation*, 81 N.Y.U. L. REV. 734, 738 (2006); *see also* Evan Mulholland, *Groundwater Quantity Regulation in Vermont: A Path* Forward, 8 VT. J. ENVTL. L. 1, 13 (2006) ("Although the simplification of groundwater to one water table level is useful for . . . conceptualization, in reality there are numerous flow regimes at different depths and speeds, possibly even flowing in different directions, due to varying levels of hydraulic pressure.").

35. *A Hydrogeological Approach*, *supra* note 29, at 231–32.

36. Coalter G. Lathrop, *Finding the Right Fit: One Design Element in the International Groundwater Resource Regime*, 19 DUKE J. COMP. & INT'L L. 413, 418 (2009).

37. *A Hydrogeological Approach*, *supra* note 29, at 216 (noting that the Nubian Sandstone Aquifer in Africa exists beneath Chad, Egypt, Libya, and Sudan).

38. *See id.* at 207 n.23 (citing C.W. FETTER, APPLIED HYDROGEOLOGY 5–6 (3d ed. 1994)).

39. *Id.* at 207–08.

40. *Id.* at 207–08.

slowly percolates downward (with gravity's help) through porous layers of soil and rocks to become groundwater.[41]

C. Aquifers

An aquifer is a subsurface layer of sand, gravel, or a similarly permeable material that contains enough water "to provide a useful water supply via wells and springs."[42] Aquifers are bound vertically by the water table, which acts as an upper limit, and a layer of impermeable rock that acts as a lower limit by preventing water from seeping further down.[43]

Despite popular perception, aquifers are not underground lakes.[44] Water in an aquifer is not stagnant; instead, it tends to flow toward surface water at natural discharge points.[45] This, however, does not mean that aquifers are underground rivers.[46] Groundwater "flows" much differently than surface water does in rivers or streams; in contrast, groundwater seeps through porous layers of earth much the same way water seeps through a sponge.[47]

Three key characteristics affect the character and quantity of groundwater in an aquifer: porosity, permeability, and recharge.[48] Porosity is the degree to which rocks are porous, and permeability is the extent to which water can pass through a given layer of soil.[49] Both affect groundwater's ability to flow through the aquifer,[50] and aquifers exist only where the earth is permeable enough to let water seep through and porous enough to store it.[51] Porosity and permeability, then, are necessary for

41. *Id.*

42. *A Hydrogeological Approach*, *supra* note 29, at 210.

43. *Id.* at 210.

44. *Id.* at 217.

45. *Id.*

46. *Id.*

47. *Id.*

48. *See* Hayman, *supra* note 31, at 121.

49. *Id.*

50. *A Hydrogeological Approach*, *supra* note 29, at 218 (noting that gravity is the "dominant force" affecting groundwater flow and that ambient air pressure, temperature, and the water table's slope also play a role).

51. *See id.* at 210.

every aquifer's formation.[52] In contrast, recharge is not a characteristic found in every aquifer.[53] Recharge is the result of water seeping down through the subsoil and into the aquifer.[54] "Recharge locally raises the water table, creates a pressure difference, and induces flow away from the recharge area."[55]

D. Types of Aquifers

Aquifers that regularly recharge fit into one of three categories: confined, unconfined, or a mixture of the two.[56] An unconfined aquifer has a border of impermeable rock or soil below and a border of permeable material above.[57] The impermeable base layer keeps water from seeping any lower and creates the buildup of water that becomes the aquifer.[58] Unconfined aquifers often connect to surface water, which filters down through the permeable layers above the aquifer.[59] The connected surface water tends to be the source of recharge for the unconfined aquifer.[60]

A confined aquifer, on the other hand, has impermeable rock bordering it above *and* below.[61] Because of this surrounding impermeable material, confined aquifers do not normally connect to—or recharge from—surface water.[62] Instead, confined aquifers are recharged through exposure to the atmosphere in higher elevations, such as hillsides or high plateaus.[63]

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52. *See id.*

53. *Id.* at 215–16.

54. *See* Hayman, *supra* note 31, at 121; *A Hydrogeological Approach*, *supra* note 29, at 220.

55. Hayman, *supra* note 31, at 121 n.215 (citing CHESTER R. LONGWELL & RICHARD F. FLINT, INTRODUCTION TO PHYSICAL GEOLOGY 203–06 (1962)).

56. *A Hydrogeological Approach*, *supra* note 29, at 210–14.

57. *Id.* at 210–11 (further noting that unconfined aquifers are sometimes known as "water-table aquifers").

58. *Id.*

59. *Id.* at 211.

60. *See id.*

61. *Id.* at 212 (further noting that confined aquifers are also called "artesian aquifers"). *Id.*

62. *Id.*

63. *See id.* (citing HERMAN BOUWER, GROUNDWATER HYDROLOGY 5–6 (1978)).

Additionally, large aquifers may be confined in some places and unconfined in others.[64]

Aquifers with no source of recharge, often called "fossil aquifers," are completely separated from the hydrological cycle.[65] The water in these aquifers dates back to the moment the aquifer formed and, as a result, is stagnant, non-renewable, and very old.[66]

III. PRECURSORS TO THE 1997 CONVENTION

Although only governments can create and effectuate international law, non-governmental organizations can have a large impact on its development by drafting model rules and making recommendations that inform governments considering such laws.[67] This "codification movement" by non-governmental groups has facilitated multilateral diplomatic attempts to create international law.[68]

One of these non-governmental groups, the International Law Association (ILA), has dedicated itself to the study and development of international law since 1873.[69] Not only do its members draft rules and make recommendations on general questions of international law,[70] but the group also enjoys special consultative status with the U.N. Economic and Social

64. *See id.* at 213–14 (describing two transboundary "mixed confined-unconfined aquifers").

65. *Id.* at 215.

66. *See id.* at 215–16; *see* Natalie Jean Kurz, Comment, *Corn Ethanol: Setting Straight a Misguided Attempt to Free the United States from Foreign Oil*, 31 HOUS. J. INT'L L. 377, 412 (2009) (noting that, in fossil aquifers that supply water for human consumption, the water is inevitably "withdrawn at a greater pace than the aquifer can naturally replace").

67. U.N. OFFICE OF LEGAL AFFAIRS, THE WORK OF THE INTERNATIONAL LAW COMMISSION, at I-1, U.N. Sales No. E.07.V.9 (7th ed. 2007).

68. *Id.*

69. *Id.*; *see* Arnulf Becker Lorca, *Universal International Law: Nineteenth-Century Histories of Imposition and Appropriation*, 51 HARV. INT'L L.J. 475, 496 n.55 (2010) (noting that the ILA was originally called the Association for the Reform and Codification of the Law of Nations).

70. INTERNATIONAL WATERCOURSES, *supra* note 3, at 380; *see* Lana Ljuboja, Comment, *Justice in an Uncooperative World: ICTY and ICTR Foreshadow ICC Ineffectiveness*, 32 HOUS. J. INT'L L. 767, 777 n. 68 (2010) (noting the ILA's role in the development of the International Criminal Court).

Council—a privilege it has claimed since 1947.[71] The ILA's studies and resolutions on transboundary freshwater were instrumental in the development of the 1997 Convention.[72]

The ILA's study of transboundary freshwater began in 1954 after international disputes arose concerning the legal right to use transboundary rivers.[73] In 1966, the ILA produced the Helsinki Rules on the Uses of the Waters of International Rivers (the Helsinki Rules), which were "a pioneering effort at comprehensive codification of the law of international watercourses."[74] This instrument applied to international drainage basins, which the Helsinki Rules defined as "a geographical area extending over two or more States determined by the watershed limits of the system of waters, *including surface and underground waters*, flowing into a common terminus."[75] The Helsinki Rules made only this one reference to groundwater, but it was not insignificant.[76] By including groundwater alongside surface water, the ILA asserted that groundwater was subject to the same rules as surface water.[77] This diverged from the traditional practice in international law of avoiding groundwater completely.[78] Through its choice of words in defining drainage basins, the ILA acknowledged the importance of regulating groundwater, and the Helsinki Rules represented the first step toward answering legal questions about groundwater that had long been disregarded in domestic and international law.[79]

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71. United Nations, Econ & Soc. Council, List of Non-Governmental Organizations in Consultative Status with the Economic and Social Council as of 1 September 2010, at 43 U.N. Doc. E/2010/INF/4 (2010).

72. INTERNATIONAL WATERCOURSES, *supra* note 3, at 381.

73. Charles B. Bourne, *The International Law Association's Contribution to International Water Resources Law*, 36 NAT. RESOURCES J. 155, 155–56 (1996).

74. INTERNATIONAL WATERCOURSES, *supra* note 3, at 380.

75. INT'L LAW ASS'N, *Helsinki Rules on the Uses of the Waters of International Rivers* art. II, in REPORT OF THE FIFTY-SECOND CONFERENCE HELD AT HELSINKI 477 (1966) (emphasis added).

76. Bourne, *supra* note 73, at 205.

77. *See id.*

78. INTERNATIONAL WATERCOURSES, *supra* note 3, at 380.

79. *See id.*; *see also* John L. Fortuna, Note, *Water Rights, Public Resources, and Private Commodities: Examining the Current and Future Law Governing the Allocation*

In 1986, the ILA expanded on the Helsinki Rules when it adopted the Seoul Groundwater Rules (the Seoul Rules).[80] Under the Seoul Rules, international law imposed a duty to "take into account any interdependence of the groundwater and other waters including any interconnections between aquifers."[81] In other words, groundwater implicated the same rights and duties as surface water.[82] This signaled another major shift toward international legal regimes that specifically considered groundwater.[83]

A. The 1997 U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses

The United Nations began to study the non-navigational uses of transboundary freshwater in 1970 through the International Law Commission (ILC).[84] Many consider the ILC to be "responsible for the 'progressive development of international law and its codification.'"[85] After twenty-four years of intensely studying relevant international law, the ILC prepared a set of draft articles that it presented to the United Nations.[86] The U.N. General Assembly adopted the draft articles

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of Georgia Water, 38 GA. L. REV. 1009, 1013 (2004) (noting that a similar Georgia tradition of avoiding groundwater regulation "was likely based on the fact that the movement of groundwater was poorly understood and difficult to determine with any certainty").

80. Gabriel Eckstein, *Application of International Water Law to Transboundary Groundwater Resources, and the Slovak-Hungarian Dispute Over Gabcikovo-Nagymaros*, 19 SUFFOLK TRANSNAT'L L. REV. 67, 92–93 (1995) [hereinafter *Application of International Water Law*]; *see generally* INT'L LAW ASS'N, *Seoul Rules on International Groundwaters*, in REPORT OF THE SIXTY-SECOND CONFERENCE HELD AT HELSINKI 251 (1986) [hereinafter *Seoul Rules*].

81. *See Seoul Rules* at art. II.

82. Joseph W. Dellapenna, *International Water Law in a Climate of Disruption*, 17 MICH. ST. J. INT'L L. 43, 83 (2008).

83. INTERNATIONAL WATERCOURSES, *supra* note 3, at 494.

84. Helal, *supra* note 22, at 340; *see* G.A. Res. 2669 (XXV), U.N. GAOR, 25th Sess., Supp. No. 28, at 127, U.N. Doc. A/8028 (Dec. 8, 1970).

85. *See* Stephen C. McCaffrey & Mpazi Sinjela, Current Development, *The 1997 United Nations Convention on International Watercourses*, 92 AM. J. INT'L L. 97, 106 (1998) (quoting Statute of the International Law Commission, art. 1(1), U.N. Doc. A/CN.4/4/Rev.2 (1982)) [hereinafter *Current Development: U.N. Convention*].

86. Helal, *supra* note 22, at 340.

in May 1997, calling them the U.N. Convention of the Law of the Non-Navigational Uses of International Watercourses (the 1997 Convention).[87] The Convention intended to establish a general framework for a groundwater regulation regime.[88] To that end, it embodied relevant customary law while setting the stage for future regional agreements regarding transboundary aquifers.[89]

The 1997 Convention embodies two central tenets of water law: (1) equitable and reasonable utilization and (2) the duty to not cause significant harm.[90] Article 5 of the Convention introduces the principle of equitable and reasonable utilization.[91] This principle does not grant all states equal portions of the benefits resulting from a given water source, and it does not force states to divide the water into identical allotments and refrain from using any more than their own portion of an aquifer's water.[92] Rather, it requires each state to utilize the water source in a way that is sustainable, equitable, and reasonable with respect to the other states sharing the water source.[93] This is the cornerstone of international water law.[94]

The second main tenet of the 1997 Convention is Article 7: The obligation to not cause significant harm.[95] To honor this obligation, a state that utilizes transboundary water must use "all appropriate measures" to avoid causing harm to its

87. *Id.* at 340–41.

88. *Id.* at 341.

89. Antonio Herman Benjamín, Cláudia Lima Marques & Catherine Tinker, *The Water Giant Awakes: An Overview of Water Law in Brazil*, 83 TEX. L. REV. 2185, 2226 (2005).

90. *See* Helal, *supra* note 22, at 342.

91. 1997 Convention, *supra* note 25, at art. 5.

92. Helal, *supra* note 22, at 342–43; *see* Int'l Law Comm'n, *Report of the International Law Commission on the Work of its Forty-Sixth Session* 98, U.N. Doc. A/49/10 (1994) [hereinafter *ILC Report*].

93. Helal, *supra* note 22, at 343; *see ILC Report*, *supra* note 92, at 98.

94. *See* Helal, *supra* note 22, at 343 (quoting Stephen McCaffrey, *The U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses: Prospects and Pitfalls*, *in* INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT 17, 19 (1998)). The principle of equitable and reasonable utilization is considered a basic and well-established principle that has "overwhelming support . . . as a general rule of law." *ILC Report*, *supra* note 92, at 98.

95. 1997 Convention, *supra* note 25, at art. 7.

neighbors, and it must not use its territory to a neighbors' detriment.[96] This is another tenet firmly established in international law.[97]

In addition to these two central principles, the 1997 Convention imposes an obligation of open communication among the states that share a water source.[98] These states must regularly exchange information about the condition of the water source.[99] This requirement is especially critical "because of the highly variable nature of aquifers and the difficulty associated with acquiring accurate information."[100]

The 1997 Convention has not reached the minimum of thirty-five ratifications necessary to bring it into force.[101] Even if it is never ratified, it will continue to be significant for several reasons.[102] First, it will continue to be an "authoritative guide" of "generally accepted new rules of international law"[103] because it reflects many years of study as well as the development of international water law.[104] Second, it reflects the general sentiment of the international community about water law, as it was created in a forum where almost any state could participate.[105] Only three states (Burundi, China, and Turkey) voted against the Convention.[106]

96. *Id.*

97. Helal, *supra* note 22, at 356.

98. 1997 Convention, *supra* note 25, at art. 9.

99. *Id.*

100. Tracy Stitt, *Evaluating the Preliminary Draft Articles on Transboundary Groundwaters Presented by Special Rapporteur Chusei Yamada at the 56th Session of the International Law Commission in Geneva, May 2004*, 17 GEO. INT'L ENVTL. L. REV. 333, 357 (2005).

101. INTERNATIONAL WATERCOURSES, *supra* note 3, at 374–75.

102. Pincus, *supra* note 27, at 319.

103. INTERNATIONAL WATERCOURSES, *supra* note 3, at 375 (quoting Statute of the International Law Commission, art. 1(1), U.N. Doc. A/CN.4/4/Rev.2 (1982)).

104. *Id.*

105. *Id.* at 376.

106. *Current Development: U.N. Convention*, *supra* note 85, at 105.

B. ILC's 2008 Draft Articles on the Law of Transboundary Aquifers

In 2002, as a logical continuation of the principles set out in the 1997 Convention, the ILC began to study groundwater.[107] The ILC appointed a Special Rapporteur to lead the studies and eventually prepare a report detailing his findings and recommendations.[108] Six years later, in 2008, the ILC completed the Draft Articles on the Law of Transboundary Aquifers (the Draft Articles) and submitted them to the U.N. General Assembly.[109] The ILC recommended that the Assembly (1) officially take notice of the Draft Articles, (2) urge states who shared transboundary aquifers to build bilateral or regional agreements based on the principles expounded in the Draft Articles, and (3) consider building a future convention around the Draft Articles.[110] The Draft Articles were intended to supplement the 1997 Convention's established framework by expanding the type of groundwater included and the types of activities regulated.[111]

The 2008 Draft Articles define key terms like "aquifer" and "transboundary aquifer" but conspicuously avoid defining "groundwater."[112] Like the 1997 Convention, the Draft Articles articulate the principle of equitable and reasonable utilization, the duty to not cause harm, and the duty to share information.[113] Only, the Draft Articles apply these principles to transboundary aquifers because the 1997 Convention did not specifically address aquifers.[114]

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107. Stephen C. McCaffrey, *The International Law Commission Adopts Draft Articles on Transboundary Aquifers*, 103 AM. J. INT'L L. 272, 274 (2009) [hereinafter *Commission Adopts Draft Articles*].

108. *See* Pincus, *supra* note 27, at 320.

109. *Commission Adopts Draft Articles*, *supra* note 107, at 272; *see generally* 2008 Draft Articles, *supra* note 26.

110. *Commission Adopts Draft Articles*, *supra* note 107, at 272; *see* Rep. of the Int'l Law Comm'n, 60th sess, May 5–June 6, July 7–Aug. 8, 2008, at 18 U.N. Doc. A/63/10; GAOR, 63d Sess., Supp. No. 10 (2008).

111. *See Commission Adopts Draft Articles*, *supra* note 107, at 272.

112. *Id.* at 275; *see* 2008 Draft Articles, *supra* note 26, at art. 2.

113. *Commission Adopts Draft Articles*, *supra* note 107, at 275; *see* 2008 Draft Articles, *supra* note 26, at arts. 4–8.

114. *See* Pincus, *supra* note 27, at 320.

In December 2008, the U.N. General Assembly decided to wait until a later time to consider whether to use the Draft Articles as the basis for a new convention.[115] As of the time this Comment was published, the General Assembly has taken no further action on this.

IV. INCREASED SPECIFICTY OF SCOPE AND DEFINED TERMS

A. The Problems with the Defined Terms

Because international law has not consistently included groundwater in agreements, one of the problems in international water management has been properly addressing groundwater.[116] By failing to consider groundwater, international law has occasionally relied on ill-defined terms that conflict with hydrogeological definitions.[117] Legal regimes have also inconsistently defined groundwater, thus fostering confusion and unequal application.[118] Effective management cannot exist unless international agreements clearly and consistently define their terms.[119]

The 1997 Convention does not directly address or seek to define groundwater.[120] It merely includes the term in its definition of "watercourse": "a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole."[121] Although this definition acknowledges groundwater, it does so only in relation to surface water.[122]

The 1997 Convention demonstrates the potential problem that can arise when international agreements do not uniformly

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115. *Commission Adopts Draft Articles*, *supra* note 107, at 292–93.

116. *See Application of International Water Law*, *supra* note 80, at 70–71.

117. *Id.* at 70*; see* Stitt, *supra* note 100, at 343–45 (describing "[t]he inconsistencies in the definitions employed by the Helsinki Rules, the Seoul Rules, and the 1997 Convention," which caused "unnecessary conflict between the legal and scientific fields").

118. *See* Stitt, *supra* note 100, at 343.

119. *Id.*

120. *See* 1997 Convention, *supra* note 25, at art. 2.

121. *Id.* at art. 2(a).

122. *See id.*; *see also Application of International Water Law*, *supra* note 80, at 94.

and accurately define groundwater.[123] Although it acknowledges groundwater connected to surface water, it does not recognize groundwater unconnected to the hydrological cycle—like the water stored in fossil aquifers.[124] By ignoring an entire category of groundwater, the Convention provides limited guidance for groundwater's management and protection.[125] The problem is that the Convention cannot adequately protect any groundwater unless it contemplates *all* groundwater.[126]

The ILC understood that the 1997 Convention lacked specific treatment of transboundary aquifers and consulted with U.N. scientific bodies to determine the proper hydrogeological definition of an aquifer.[127] The 2008 Draft Articles define an aquifer as "a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation."[128]This definition is similar to the hydrogeological definition of an aquifer.[129] Interestingly, the 2008 Draft Articles neither use the word "groundwater" in defining "aquifer" nor separately define groundwater.[130]

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123. *See* Stitt, *supra* note 100, at 334–35 (arguing that applying the 1997 Convention equally to groundwater and surface water inappropriately ignores inherent differences between the two).

124. Stitt, *supra* note 100, at 344. This leaves isolated fossil aquifers in an uncertain position. *See supra* notes 65–66 and accompanying text.

125. *See* Stitt, *supra* note 100, at 342–43.

126. *See id.* at 343 ("Before transboundary groundwaters can be effectively managed on an international level, uniform definitions that clearly explain the coverage of the articles must be established.").

127. *Commission Adopts Draft Articles*, *supra* note 107, at 272. The U.N. Educational, Scientific and Cultural Organization (UNESCO) was one of the U.N. groups that helped the ILC work out a proper definition. *Id.* The Draft Articles define "aquifer," "aquifer system," "transboundary aquifer," and "recharging aquifer," among other relevant terms. 2008 Draft Articles, *supra* note 26, at art. 2.

128. 2008 Draft Articles, *supra* note 26, at art. 2.

129. *See A Hydrogeological Approach*, *supra* note 29, at 210 (defining an aquifer as a "permeable geological formation . . . [that] provides a useful water supply via wells and springs . . . [and] the upper limit of the saturated area is known as the water table").

130. *See Commission Adopts Draft Articles*, *supra* note 107, at 275; *see also* 2008 Draft Articles, *supra* note 26, at art. 2. The ground's saturated zone is the point below the water table where the soil becomes saturated with water. *See A Hydrogeological Approach, supra* note 29, at 209. Because groundwater is water located below the water table, and the water table is the point of ground saturation, the water in the aquifer is groundwater. *Id.* at 209–10.

Merely by contemplating aquifers, the 2008 Draft Articles improve upon the silence of the 1997 Convention.[131] The 1997 Convention defines groundwater in terms of its connection with surface water, which unduly restricts the type of groundwater protected.[132] The ILC had the right idea when drafting the 2008 Draft Articles; rather than being lumped in with surface water, groundwater should be addressed separately.[133]

However, even with this improvement, the 2008 Draft Articles still fail to adequately address groundwater in three ways.[134] First, although they properly define aquifers and transboundary aquifers in the hydrogeological sense, they still do not contemplate all aquifers.[135] For instance, an aquifer may be located entirely in one state but feed into surface water that flows from that state to another.[136] Since its corpus is contained in a single state, this kind of aquifer would not satisfy the 2008 Draft Articles' definition of transboundary aquifer.[137] These aquifers may fit within the definition of a "recharge zone,"[138] but would still fall outside the Draft Articles' reach because "the general principles contained in the draft evidently do not apply to [recharge] zones, as they govern transboundary aquifers and aquifer systems."[139] As a result, the Draft Articles, just like the 1997 Convention, fail to contemplate all relevant terms and thus offer limited guidance at best.[140]

Second, the Draft Articles misplace their emphasis.[141] Had they been designated the "Draft Articles on the Law of *the Waters* of Transboundary Aquifers," their relevance to

131. *Commission Adopts Draft Articles*, *supra* note 107, at 282–83.

132. Stitt, *supra* note 100, at 344.

133. Pincus, *supra* note 27, at 325.

134. *See Commission Adopts Draft Articles*, *supra* note 107, at 282–84.

135. *Id.* at 285.

136. *Id.*

137. *See* 2008 Draft Articles, *supra* note 26, at art. 2 (defining "transboundary aquifer" as an aquifer that has parts "situated in different States"); *see also Commission Adopts Draft Articles*, *supra* note 107, at 285.

138. The 2008 Draft defines recharge zone as the area "which contributes water to an aquifer." 2008 Draft, *supra* note 116, at art. 5.

139. *Commission Adopts Draft Articles*, *supra* note 107, at 285.

140. *See* Stitt, *supra* note 100, at 342–43.

141. *See Commission Adopts Draft Articles*, *supra* note 107, at 282–83.

groundwater would have been clear and undeniable.[142] In contrast, as the "Draft Articles on the Law of Transboundary Aquifers," their authority on groundwater issues is immediately questionable.[143] By choosing this approach, the ILC did not explicitly confine the Draft Articles to non-water application, but it did take a different path than the ILA, which had formulated the Seoul Rules more than twenty years earlier.[144] Effectively, the ILC left it open to interpretation whether the Draft Articles adequately anticipated the legal ramifications of groundwater.[145] "Unfortunately, the [Draft Articles] make clear that their overriding concern is with the rock, not the water."[146]

Whereas the name may seem ambiguous regarding groundwater, the Draft Articles themselves make it clear that groundwater is a secondary concern.[147] They define an aquifer as "a permeable water-bearing geological formation underlain by a less permeable layer and the water contained in the saturated zone of the formation."[148] This correctly explains the geology of an aquifer, but it only acknowledges groundwater.[149] Groundwater is not separately defined.[150] Furthermore, by focusing on immobile geological formations, they overlook groundwater's mobility.[151] The water located in the aquifer does not stay contained in that formation; instead, it flows and moves through the earth.[152] So, although the ILC envisioned a document that complimented the 1997 Convention governing

142. *See id.* at 283.

143. *Commission Adopts Draft Articles*, *supra* note 107, at 283.

144. *See id.*

145. *Id.* ("By focusing primarily on the geologic formation, and only secondarily referring to the 'water contained in' it, the draft invites confusion as to whether the geological formation (rock) or its content (water) is the primary subject of legal regulation.").

146. *See Commission Adopts Draft Articles*, *supra* note 107, at 283.

147. *Id.*

148. 2008 Draft Articles, *supra* note 26, at art. 5.

149. *Commission Adopts Draft Articles*, *supra* note 107, at 282–83.

150. *See* 2008 Draft Articles, *supra* note 26, at art. 2.

151. *Commission Adopts Draft Articles*, *supra* note 107, at 286–87.

152. *A Hydrogeological Approach*, *supra* note 29, at 217.

international watercourses, the 2008 Draft Articles actually depart from it by failing to focus on the same thing: water.[153]

The third way the 2008 Draft Articles fail to create a workable legal regime for groundwater is by significantly overlapping the 1997 Convention.[154] The 1997 Convention addresses all groundwater that eventually connects with surface water.[155] The 2008 Draft Articles apply to all transboundary aquifers, regardless of whether they come into contact with surface water.[156] As a result, *both* instruments apply where groundwater contained in a transboundary aquifer connects to surface water.[157] The 2008 Draft Articles extend beyond the 1997 Convention only with regard to water contained in transboundary fossil aquifers.[158]

The significant overlap between these two documents is problematic.[159] Should a situation arise where both could apply, it is not clear which instrument should govern.[160] That confusion is complicated by the fact that, though the two instruments would effectively achieve the same result in most situations, they are ostensibly concerned with two different things: The 1997 Convention addresses water, and the 2008 Draft Articles address a geological formation.[161]

B. Possible Solutions

These three problems are relatively simple to fix. First, the hydrogeological definitions can be adjusted to contemplate groundwater available in *all* aquifers.[162] Keeping legal definitions in line with scientific observation is important, and

153. *Commission Adopts Draft Articles*, *supra* note 107, at 283.

154. *Id.* at 283–84.

155. *See supra* notes 120–22 and accompanying text.

156. *See Commission Adopts Draft Articles*, *supra* note 107, at 283.

157. *Id.*

158. *Id.* at 283–84.

159. *Id.* at 284.

160. *See id.*

161. *Compare* 1997 Convention, *supra* note 25, at art. 1, (applying to water systems), *with* 2008 Draft Articles, *supra* note 26, at art. 1 (applying to geological formation).

162. *See Commission Adopts Draft Articles*, *supra* note 107, at 285.

with a resource as critical as water, it is just as important to anticipate all possible applications.[163] Once the definitions are reworked to consider domestic aquifers connected to transboundary surface water, the Draft Articles will properly apply to all groundwater with international implications.[164]

Additionally, the 2008 Draft Articles should shift their focus toward groundwater and away from the geological formation.[165] By applying to water, the 2008 Draft Articles would unambiguously apply to the subject matter of the 1997 Convention.[166] Additionally, shifting the focus away from an immobile geological formation would help avert potential sovereignty issues.[167] Shifting the subject of regulation to groundwater—something already known to flow across political boundaries—would diminish the tendency to claim sovereignty and promote the concept of a shared resource.[168]

The third problem, the potential overlap of the 2008 Draft Articles with the 1997 Convention, can be resolved in two ways.[169] The first is to use the 2008 Draft Articles only as a guide for states to use when drafting agreements on transboundary groundwater.[170] Although the U.N. General Assembly has not ruled out the possibility of using the 2008 Draft Articles as the basis for a new U.N. convention,[171] it may elect to keep them only as a practice guide.[172] Alternatively, if the General Assembly does use the 2008 Draft Articles to outline a convention, the 2008 Draft Articles should take precedence over the 1997 Convention when either could apply.[173] The 2008 Draft Articles were created specifically to address

163. Stitt, *supra* note 100, at 343.

164. *See Commission Adopts Draft Articles*, *supra* note 107, at 285.

165. *Id.* at 282.

166. *See id.* at 283–84.

167. *See id.* at 286. A state is more likely to claim sovereignty over an immobile geological formation than over a liquid that flows through the earth. *Id.*

168. *See id.* at 286–87.

169. *See id.* at 284; Stitt, *supra* note 100, at 346–47.

170. *Commission Adopts Draft Articles*, *supra* note 107, at 284.

171. *See supra* note 115 and accompanying text.

172. *Commission Adopts Draft Articles*, *supra* note 107, at 284.

173. Stitt, *supra* note 100, at 346–47.

transboundary groundwater and are better suited to inform state action on groundwater issues.[174]

V. CENTRAL TENET: EQUITABLE AND REASONABLE UTILIZATION

A. Groundwater Factors for Equitable and Reasonable Utilization

Equitable and reasonable utilization is a central tenet of international water law that calls on states to "use an international watercourse in a manner that is equitable and reasonable vis-à-vis other states sharing the watercourse."[175] This principle does not mandate that all states with access to a given watercourse divide it up equally among them, nor does it entitle these states to a proportional division of the water itself.[176] Rather, this principle concerns a state's right to a reasonable use of the benefits of the watercourse, and its protection from infringement by other states.[177] Equitable and reasonable utilization, therefore, should be considered from two standpoints: "from the use itself and from the way in which the derived benefits are to be apportioned between States."[178] Both the use of the watercourse *and* the allocation of the water between states must be reasonable.[179]

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174. *Id.*

175. Helal, *supra* note 22, at 342–43 (quoting Stephen McCaffrey, *The U.N. Convention on the Law of the Non-Navigational Uses of International Watercourses: Prospects and Pitfalls*, *in* INTERNATIONAL WATERCOURSES: ENHANCING COOPERATION AND MANAGING CONFLICT, 17, 19 (Salman M.A. Salman & Laurence Boisson de Chazournes, eds., 1998)).

176. *Id.* at 343 (quoting *ILC Report*, *supra* note 92, at 98).

177. Stitt, *supra* note 100, at 350 ("States were not to be deprived of this right by other States."); *see ILC Report*, *supra* note 92, at 97 ("[I]t implies attaining maximum possible benefits for all watercourse States and achieving the greatest possible satisfaction of all their needs, while minimizing the detriment to, or unmet needs of, each.").

178. Julio Barberis, *The Development of International Law of Transboundary Groundwater*, 31 NAT. RES. J. 167, 176 (1991).

179. *Id.*

Equitable and reasonable utilization involves a cost-benefit analysis.[180] After weighing the costs and benefits of each option, the ideal use of the watercourse is the option with the largest net positive effect.[181] The goal is the utilitarian ideal of limiting waste while providing the maximum benefit.[182]

The 1997 Convention provides a non-exhaustive list of factors that should be considered when determining equitable and reasonable use of a watercourse.[183] The list is laid out in Article 6:

> a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
> b) The social and economic needs of the watercourse States concerned;
> c) The population dependent on the watercourse in each watercourse State;
> d) The effects of the use or uses of the watercourse in one watercourse State on other watercourse States;
> e) Existing and potential uses of the watercourse;
> f) Conservation, protection, development and economy of use of the water resource of the watercourse and the costs of measures taken to that effect;
> g) The availability of alternatives, of comparable value, to a particular planned or existing use.[184]

No single factor should form the entire basis for determining the equitable and reasonable use of a watercourse.[185]

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180. *Application of International Water Law*, *supra* note 80, at 78–79.

181. *See id.*

182. *Id.* at 78; *see* Roberto Garza Barbosa, *The Philosophical Approaches to Intellectual Property and Legal Transplants. The Mexican Supreme Court and NAFTA Article 1705*, 31 HOUS. J. INT'L L. 515, 522 (2009) (describing utilitarian policies as those for which "the principal purpose is the overall result that will benefit the society").

183. 1997 Convention, *supra* note 25, at art. 6.

184. *Id.*

185. *See* Helal, *supra* note 22, at 353–54.

Additionally, Article 6 is not intended to be exhaustive; all relevant factors should be taken into account.[186]

The Article 6 factors fail to provide clear guidance, particularly on groundwater.[187] The first group of factors, for instance, lumps together all natural characteristics of a watercourse.[188] It does not consider characteristics unique to groundwater like porosity and storage coefficient that have significant effects on the quantity of available groundwater.[189] These and other characteristics particular to groundwater must be considered to make an accurate determination of groundwater's equitable and reasonable utilization.[190]

The Draft Articles represent only marginal improvement in this arena. Like the Convention, they provide a non-exhaustive list of factors that weigh on reasonable and equitable utilization,[191] and states are encouraged to consider other relevant factors in making a determination.[192] The Draft Articles lists essentially the same factors listed in the Convention, with two additions: "the contribution to the formation and recharge of the aquifer or aquifer system" and "the role of the aquifer or aquifer system in the related ecosystem."[193] These two factors improve upon the 1997 Convention by recognizing the impact of geological characteristics on groundwater.[194]

Even with these additional factors, though, the 2008 Draft Articles still gloss over several of groundwater's unique

186. *See* Stitt, *supra* note 100, at 351.

187. *Id.* at 351–52.

188. *Id.* at 351. The first group of factors is "geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character." 1997 Convention, *supra* note 25, at art. 6.

189. Stitt, *supra* note 100, at 351–52.

190. *Id.* at 351.

191. 2008 Draft, *supra* note 116, at art. 5.

192. Commentaries to the Draft Articles on the Law of Transboundary Aquifers, *in* Rep. of the Int'l Law Comm'n, 60th sess, May 5–June 6, July 7–Aug. 8, 2008, at 19, 45–46 U.N. Doc. A/63/10; GAOR, 63d Sess., Supp. No. 10 (2008) [hereinafter Draft Article Commentaries].

193. 2008 Draft, *supra* note 116, at art. 5.; *see* Draft Article Commentaries, *supra* note 192, at 45.

194. *See* Stitt, *supra* note 100, at 351–52.

vulnerabilities.[195] For example, the 2008 Draft Articles list the "natural characteristics of the aquifer" as a factor to be considered.[196] This repeats the mistakes of the 1997 Convention, which too broadly defined the factors.[197] The 2008 Draft Articles should narrow their focus in order to assist states in accurately determining the equitable and reasonable utilization of groundwater.[198]

One specific factor the Draft Articles should consider is environmental sensitivity, which is critical to maintaining usable groundwater.[199] It takes into account the "elevated pollution concerns associated with groundwater."[200] Porosity, permeability, and environmental sensitivity are just a few of the factors that influence the ability and speed with which contaminants can enter into groundwater.[201] These characteristics help explain why groundwater is more susceptible to elevated levels of pollution than surface water.[202]

To be a stronger guide for equitable and reasonable utilization of groundwater, the Draft Articles should tailor the factor list to groundwater.[203] They should highlight specific "natural characteristics" of an aquifer instead of listing a general category.[204] Porosity and permeability greatly affect the amount and quality of groundwater, and they should be listed among the factors to be considered in determining equitable and reasonable utilization.[205] The Draft Articles can drastically increase their effectiveness by adding these and other groundwater-specific considerations to this factor list.[206]

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195. *See Id.* (advocating consideration of several other factors, including environmental sensitivity and artificial recharge potential).

196. 2008 Draft Articles, *supra* note 26, at art. 5.

197. *See supra* notes 187–90 and accompanying text.

198. Stitt, *supra* note 100, at 351.

199. *Id.* at 352.

200. *Id.*

201. *Id.*

202. *Id.*

203. *See id.* at 351–53.

204. *Id.* at 351.

205. *Id.*

206. *See id.* at 352–53.

B. The Human Rights Dimension

Access to freshwater sources is undeniably linked to human rights.[207] Freshwater is essential to life, and it facilitates sanitation, cleansing, and other basic tasks necessary "for ensuring human dignity."[208] Further, it ensures long-term prosperity by fueling agricultural development.[209] Freshwater is more than a mere precondition for physical wellbeing; it is also crucial to many cultures and religions.[210] Depriving someone of drinking water is depriving that person of a necessity of life.[211] It means depriving that person of a basic human right.[212]

Water deprivation can occur from government neglect or mismanagement, political manipulation, or natural events.[213] Water deprivation and shortages can lead to famine, disease, forced relocation, and even death.[214] Such serious effects, coupled with heavy demands on limited groundwater, merit recognizing access to freshwater as a basic human right.[215] And, in light of the serious repercussions of water deprivation, "[i]nternational water law should assign a prominent role to the human rights dimension among the factors weighed under the equitable utilization standard."[216] The human rights consideration should be two-fold: requiring states to ensure that

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207. *E.g.*, Note, *What Price for the Priceless?: Implementing the Justiciability of the Right to Water*, 120 HARV. L. REV. 1067, 1073 (2007) (noting that international law "increasingly recognizes access to water as a fundamental human right"); Eyal Benvenisti, *Collective Action in the Utilization of Shared Freshwater: The Challenges of International Water Resources Law*, 90 AM. J. INT'L L. 384, 406 (1996).

208. Benvenisti, *supra* note 207, at 406; *see A Human Right to Water*, *supra* note 14, at 5.

209. *See* Benvenisti, *supra* note 207, at 406; *see also A Human Right to Water*, *supra* note 14, at 5 (noting that insufficient water for agriculture "can lead to famine, disease and even death").

210. Benvenisti, *supra* note 207, at 406.

211. *Id.*

212. *See id.* (describing water as necessary for the human body as well as humans' socioeconomic wellbeing); *see also A Human Right to Water*, *supra* note 14, at 8 (inferring a right to water from the Universal Declaration of Human Rights).

213. *See A Human Right to Water*, *supra* note 14, at 7; *see also* Benvenisti, *supra* note 207, at 407.

214. *A Human Right to Water*, *supra* note 14, at 7.

215. *Id.*

216. Benvenisti, *supra* note 207, at 407.

its people would have a minimum amount of groundwater for "decent human subsistence,"[217] and requiring that states provide for "progressive improvement in meeting water-dependent human needs."[218]

This human rights consideration would fit well in the 1997 Convention's Article 6 list of factors for determining equitable and reasonable utilization, but Article 6 does not address human rights.[219] It calls on watercourse states to consider only other states' social and economical needs when determining equitable and reasonable utilization.[220] This criterion arguably includes human rights, but Article 6 gives no clear indication that human rights should be considered.[221]

The 1997 Convention does not reference human rights until Article 10, which calls on states to give "special regard" to "vital human needs."[222] This note is "both misplaced and attenuated" because it is not placed with the factors of equitable utilization.[223] Additionally, Article 10 fails to define "special regard," and as written it seemsthat "special regard" is a minimum standard that does not require state action.[224] This passive requirement fails to emphasize the importance of human rights.[225]

The 2008 Draft Articles likewise fail to highlight the importance of a human rights consideration.[226] A human rights consideration is not amidst the factors listed in Article 5 as relevant to determine equitable and reasonable utilization.[227] Instead, the last sentence of a separate subsection of Article 5

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217. *Id.* at 406.

218. *Id.*

219. 1997 Convention, *supra* note 25, at art. 6; *see also* Benvenisti, *supra* note 207, at 407–08 (noting the lack of "vital human needs" from the draft articles).

220. 1997 Convention, *supra* note 25, at art. 6(b).

221. Benvenisti, *supra* note 207, at 407–08.

222. 1997 Convention, *supra* note 25, at art. 10(2).

223. Benvenisti, *supra* note 207, at 407.

224. KNUT BOURQUAIN, FRESHWATER ACCESS FROM A HUMAN RIGHTS PERSPECTIVE: A CHALLENGE TO INTERNATIONAL WATER AND HUMAN RIGHTS LAW 41 (2008).

225. *See id.*; *see also* Benvenisti, *supra* note 207, at 407–08.

226. Benvenisti, *supra* note 207, at 407–08.

227. 2008 Draft Articles, *supra* note 26, at art. 5(1).

requires that "special regard" be given to "vital human needs."[228] Although the 2008 Draft Articles thus succeed in including a human rights determination in the algebra of equitable and reasonable utilization, the placement of that human rights consideration away from the other enumerated factors suggests the drafters gave it less importance than the other factors.[229] The 2008 Draft Articles also parrot the "special regard" language from the 1997 Convention.[230] This language remains too imprecise to provide clear guidance.[231]

The Draft Articles should add a clear, prominent human rights consideration into the factors for equitable and reasonable utilization.[232] When considering the benefits against the detriments of a project involving an aquifer or watercourse, "vital human needs" should be one of the primary factors considered.[233]

The connection between human rights and environmental protection is not a new concept.[234] Environmental protection "is justified on the grounds of its importance to the enjoyment of basic human rights and human survival . . . norms of environmental protection and human rights share a common platform."[235] Further, human rights address both the individual interest to groundwater and the state's interest in using the water source.[236] Water projects can have a tremendously adverse effect on the water source and the individuals who rely

228. *Id.* at art. 5(2).

229. Benvenisti, *supra* note 207, at 407–08.

230. 2008 Draft Articles, *supra* note 26, at art. 5; *see* 1997 Convention, *supra* note 25, at art. 10.

231. *See supra* notes 224–25 and accompanying text.

232. *See* Benvenisti, *supra* note 207, at 406.

233. *See id.* at 408 (arguing that the 1997 Convention should highlight the human rights consideration).

234. Ole W. Pedersen, *European Environmental Human Rights and Environmental Rights: A Long Time Coming?*, 21 GEO. INT'L ENVTL. L. REV. 73, 73–74 (2008). The first linkage between human rights and environmental protection was in the 1972 Stockholm Declaration, which represented the first recognition of the environment's role in human rights. *Id.* at 77.

235. *See id.* at 75–76 (summarizing Vice President Christopher Weeramantry's opinion in the Gab íkovo-Nagymaros case in the International Court of Justice).

236. BOURQUAIN, *supra* note 224, at 115.

on it.[237] Coupled with the rapidly increasing need for freshwater, this mandates that human rights play a more prominent role in determining equitable and reasonable utilization of the water source.[238]

VI. CENTRAL TENET: DUTY TO NOT CAUSE SIGNIFICANT HARM

A. The Problems with the Duty to Not Cause Harm

Alongside the equitable and reasonable utilization of a water source,[239] the duty to not cause significant harm stands as the other central tenet in international water law.[240] Widely recognized in customary international law, this principle prohibits a state from using its territory, or allowing its territory to be used, to infringe upon the rights of another state.[241] This affirmative duty requires states to consider other states' rights and interests when undertaking an action.[242] Instruments that enumerate this principle also tend to define the threshold at which a state's action will cause harm to another state.[243] Some international instruments state that the harm must be "substantial" or "appreciable" before a state may invoke international law.[244] The threshold must be clearly defined, or there is no way to know how wide or narrow to construe this obligation.[245]

The 1997 Convention enumerates the obligation to not cause significant harm in Article 7 and breaks it up into two parts.[246] The first part declares that "watercourse States shall . . . take all appropriate measures to prevent the causing of significant

237. Benvenisti, *supra* note 207, at 407.

238. *Id.*

239. *See supra* Part IV.

240. Helal, *supra* note 22, at 342.

241. *Application of International Water Law*, *supra* note 80, at 75.

242. Stitt, *supra* note 100, at 353.

243. *Application of International Water Law*, *supra* note 80, at 78.

244. *Id.*

245. *Commission Adopts Draft Articles*, *supra* note 107, at 276.

246. 1997 Convention, *supra* note 25, at art. 7.

harm to other watercourse States."[247] In other words, the states sharing the watercourse will have equal sovereignty and equal right to use the source; no single state will have a greater right to use the source.[248] This principle places limits on a state's freedom to act and utilize the watercourse's benefits.[249]

The second part of Article 7 declares that where a state has caused harm, it must "take all appropriate measures . . . to eliminate or mitigate such harm."[250] The emphasis on this part of the obligation is on the harming state's action and conduct, rather than on the end result of eliminating the harm.[251] The harming state must attempt to eliminate the harm first and, if that is not possible, it must try to mitigate the harm.[252]

The 1997 Convention's expression of the duty to cause no harm is problematic. The Convention clearly limits a state's sovereignty and right to use the benefits of a watercourse by requiring watercourse states to consider the rights of other states sharing the watercourse.[253] However, the Convention fails to clearly articulate how this obligation functions and in fact is silent on what exactly *is* the obligation.[254] The 1997 Convention instructs states to take "all appropriate measures," but does not indicate what "appropriate" means and how the states should determine what measures are required.[255] Instead

247. *Id.* at art. 7(1).

248. Helal, *supra* note 22, at 356.

249. *Id.*

250. 1997 Convention, *supra* note 25, at art. 7(2). The placement of this duty to mitigate harm is after the duty to prevent harm, which suggests that the watercourse state's first priority is to prevent any harm. *See Current Development: U.N. Convention*, *supra* note 85, at 100–01 (arguing that the duty to prevent harm is implicitly more important that the duty to mitigate harm caused).

251. *Current Development: U.N. Convention*, *supra* note 85, at 100.

252. *Id.* at 102.

253. 1997 Convention, *supra* note 25, at art. 7(1).

254. *See* Helal, *supra* note 22, at 356, 358–59; *see also Current Development: U.N. Convention*, *supra* note 85, at 101 (noting that the second part of the obligation, to mitigate any damage caused, was "rather awkward, somewhat ambiguous and probably not entirely satisfying to anyone").

255. *See* Stitt, *supra* note 100, at 354 (examining the preliminary version of the 2008 Draft Articles, which were written almost a decade after the 1997 Convention but which use virtually the same the key language).

of being a guide on how this duty operates, the Convention succeeds only in providing a vague description of the duty.[256]

This amorphous definition has led to varying opinions on how much importance should be placed on the obligation.[257] This uncertainty shadows the significance and importance of the duty to not cause harm.[258] The purpose of the 1997 Convention is to protect, preserve, and manage watercourses, but a weakly defined duty to not cause significant harm severely undermines that purpose.[259]

The 2008 Draft Articles articulate the same duty in Article 6.[260] They expand states' obligations under the 1997 Convention and rephrase the rest of the duty.[261] Aquifer states must "take all appropriate measures to prevent the causing of significant harm to other aquifer States or other States in whose territory a discharge zone is located."[262] This duty of preventing harm is not restricted to other states sharing the aquifer; it applies to any state where there is a discharge zone.[263] This expanded duty recognizes the hydrogeology of aquifers,[264] many of which have discharge zones located in different states.[265]

Likewise, the Draft Articles expand the duty to cause no harm to encompass "undertaking activities . . . that have, or are likely to have, an impact on that transboundary aquifer or aquifer system"—even where those activities are not directly

256. *See* Helal, *supra* note 22, at 362 (calling the Convention's obligation to not cause harm "rather nebulous").

257. *Id.*

258. *See id.*

259. 1997 Convention, *supra* note 25, at art. 1(1); *see* Helal, *supra* note 22, at 362.

260. 2008 Draft Articles, *supra* note 26, at art. 6.

261. *Commission Adopts Draft Articles*, *supra* note 107, at 276.

262. 2008 Draft, *supra* note 116, at art. 6(1).

263. *Commission Adopts Draft Articles*, *supra* note 107, at 276.

264. *Id.* (describing Article 6 as one of the few articles that specifically addresses discharge zones).

265. *Id.* at 277–78. Note that such an aquifer would be considered a "transboundary aquifer" according to the 2008 Draft only if the aquifer had parts shared by states; if the aquifer was contained only in one state but had a discharge zone outside of that state, it would not be considered a transboundary aquifer under the current definition. *See supra* notes 135–39 and accompanying text.

connected to transboundary aquifers.[266] Unlike the Convention, the Draft Articles specifically indicate that aquifer states should exercise due diligence during any conduct that may affect the aquifer.[267]

Unfortunately, the second part of the 2008 Draft Articles' duty to not cause significant harm does not similarly improve upon the 1997 Convention.[268] According to the 2008 Draft Articles, where significant harm has occurred, the responsible state "shall take . . . all appropriate response measures to eliminate or mitigate such harm."[269] Thus, the 2008 Draft Articles merely rephrase the 1997 Convention's duty to eliminate or mitigate harm, and they make no significant changes to the duty.[270]

Overall, the 2008 Draft Articles' duty to not cause significant harm improves on the Convention because it recognizes and provides for the hydrogeology of an aquifer; it extends the principle to states where the aquifer's discharge is located.[271] The 2008 Draft Articles also clarify that a state is obligated to not cause harm during any activity that may impact the water source; the duty is not limited to situations where a state utilizes the water source.[272] This shows the drafters recognized that using the aquifer is not the only way to adversely affect the water source.[273]

Even with these improvements, though, the 2008 Draft Articles' duty to not cause harm falls short of adequately protecting aquifers.[274] First, the 2008 Draft Articles mirror the

266. 2008 Draft Articles, *supra* note 26, at art. 6(2).

267. *Compare id.* at art. 6(1)–(2) (applying the obligation to not cause significant harm when "utilizing transboundary aquifers" and when "undertaking activities other than utiliz[ing]" the aquifer), *with* 1997 Convention, *supra* note 25, at art. 7(1) (applying the obligation only when "utilizing an international watercourse").

268. *Commission Adopts Draft Articles*, *supra* note 107, at 276.

269. 2008 Draft Articles, *supra* note 26, at art. 6(3).

270. *Commission Adopts Draft Articles*, *supra* note 107, at 276.

271. *Id.*

272. *Id.*

273. *See id.* (arguing the expansion was necessary "to prevent an unduly narrow reading of the obligation").

274. *See* Stitt, *supra* note 100, at 354–56.

vague and imprecise language of Convention.[275] The key terms of the principle, such as "all appropriate measures" and "impact," remain undefined and without any indication on how to interpret these terms.[276]

Second, the Draft Articles use same threshold of "significant harm" as the 1997 Convention.[277] Using the same standard of harm in both instruments is problematic because, as should be clear by now, groundwater and surface water do not have the same qualities.[278] Groundwater has unique characteristics, highlighted by its vulnerability to pollution.[279] Surface water's swift current often dissipates pollution, but groundwater flows more slowly and tends to collect and store pollution.[280] Because groundwater cannot self-clean as rapidly as surface water can, groundwater can become permanently contaminated.[281] Because of this, groundwater pollution is usually more serious than surface water pollution.[282] Given the particular vulnerability of groundwater, it does not make sense to protect it with the same "significant harm" standard applied to surface water.[283]

The 2008 Draft Articles were intended to complement the 1997 Convention by creating special protection for groundwater, but they undermine this purpose by applying the same harm standard for groundwater that the Convention applies to surface water.[284] The mirrored language suggests that the authors of the 2008 Draft Articles overlooked the importance of groundwater's particular sensitivities.[285] As a result, the Draft

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275. *Id.* at 353–54.

276. *Id.* at 354.

277. *Id.*; *see* 2008 Draft Articles, *supra* note 26, at art. 7; 1997 Convention, *supra* note 25, at art. 6.

278. Stitt, *supra* note 100, at 351–54.

279. *Application of International Water Law*, *supra* note 80, at 87–88 n.82.

280. *Id.* Surface waters, such as rivers and streams, are able to self-clean, whereas groundwater usually cannot. *Id.* Surface water currents can eliminate or move pollution to less harmful levels. *Id.* Groundwater tends to flow very slowly, and thus pollution generally continues to accumulate and remain stored in groundwater. *Id.*

281. *Id.* Groundwater can take at least 100 years to self-clean. *Id.*

282. *Id.*; Stitt, *supra* note 100, at 352.

283. Stitt, *supra* note 100, at 354.

284. *Id.*

285. *See Commission Adopts Draft Articles*, *supra* note 107, at 276; *see also* Stitt,

Articles' obligation to not cause harm is not as strong as it should be.[286] This should be revised and strengthened to ensure heightened protection of groundwater.[287] The ambiguities of key terms such as "impact" and "all appropriate measures" can—and should—be more specifically defined to minimize ambiguity.[288] Also, because groundwater is more susceptible to lasting pollution than surface water is, it should have a lower threshold of harm.[289]

The heart of the problem with the 1997 Convention and 2008 Draft Articles is that they purport to proactively protect water by imposing an affirmative duty on states, but they only succeed in defining a reactive duty.[290] That is, instead of emphasizing ways to prevent harm from occurring, the instruments define a state's duty to mitigate or eliminate the harm once it occurs.[291] If their focus were to shift away from a state's responsive actions and toward a state's preventative, affirmative duty, they would better guide states in taking proactive, appropriate measures to prevent causing harm to other states.[292]

B. Possible Solutions

To better guide states the 2008 Draft Articles should consider, among other things, adding a requirement for periodic environmental impact assessments (EIAs).[293] An EIA does not

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supra note 100, at 354–55.

286. Stitt, *supra* note 100, at 354–56.

287. *See id.* at 356.

288. *Id.* at 354–56.

289. *Id.*

290. *See Application of International Water Law*, *supra* note 80, at 90.

291. *See id.* (noting that legal regimes tend to focus on "reactionary responses to individual situations rather than offering a proactive means to prevent such predicaments").

292. *See* Stitt, *supra* note 100, at 356.

293. EIAs are highly customizable and can be calibrated, for example, to consider a project's groundwater-specific effects. *Compare* Giancarlo Guardia Gonzalez, *The Camisea Project: Developing Legal Frameworks for Avoiding Social and Environmental Conflicts in Sensitive Areas*, 31 HOUS. J. INT'L L. 213, 219–20 (2009) (describing a Peruvian EIA requirement for a "Community Relations Plan"), *with* Carlos J. Moreno, Comment, *Oil and Gas Exploration and Production in the Gulf of Guinea: Can the New*

prohibit a state from taking actions that might negatively impact the environment; it merely requires the state to study a project's possible environmental impact before undertaking any action.[294] The assessment considers the detrimental impacts of a project and compares them to any benefits, and the results are used to either justify proceeding with the project as planned or searching for a more environmentally friendly alternative.[295] The goal of environmental impact assessments is to make states more environmentally responsible.[296] EIAs, therefore, generally involve three actions: First, a state assesses potential environmental effects of an action, then it notifies the states that may be affected by its actions, and finally it consults with these states to determine what steps to take.[297]

Scholars have also pointed out feasibility issues of environmental impact assessments, such as the high costs of studies, "increased need for institutional coordination, information exchange, sensitivity to sovereignty, political partnerships, varying cultural approaches, language differences and public participation across borders."[298] However, these practical issues are outside the scope of this Comment, which focuses on the theoretical ways to enhance protection of groundwater.

The risk of imposing required EIAs is that countries will hire third parties to perform an EIA to produce certain desired results.[299] In such a case, the EIA would begin only after the final decision to proceed with the project has already been

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Gulf be Green?, 31 HOUS. J. INT'L L. 419, 451–52 (2009) (describing EIAs required under the Kuwait Protocol and their ability to address particular concerns about surrounding marine environments).

294. Charles M. Kersten, *Rethinking Transboundary Environmental Impact Assessment*, 34 YALE J. INT'L L. 173, 174 (2009).

295. *Id.*

296. *Id.* at 180.

297. *See* John H. Knox, *The Myth and Reality of Transboundary Environmental Impact Assessment*, 96 AM. J. INT'L L. 291, 295 (2002).

298. *See* Angela Z. Cassar & Carl E. Bruch, *Transboundary Environmental Impact Assessment in International Watercourse Management*, 12 N.Y.U. ENVTL. L.J. 169, 179 (2003); *see also* Kersten, *supra* note 294, at 183.

299. *See* Kersten, *supra* note 294, 181.

made.[300] One way around this problem might be to require states to notify other states of its possible project and the EIA before the results of the assessment are made known.[301] That way, the states that may be affected by the project have an opportunity to actively participate in the EIA rather than merely being presented with results.[302] Another way around this problem might be to require states to notify major environmental non-governmental organizations located within the countries prior to beginning an EIA.[303] Such organizations may have knowledge and expertise otherwise unavailable, and they may also be able to provide a distinct—and objective—perspective on the anticipated projects and EIAs.[304]

VII. CONCLUSION

The paucity of freshwater mandates careful management of freshwater sources. The planet's rapidly increasing population and socioeconomic growth is already stressing freshwater sources, and these sources must be carefully managed to keep up with the growing demand. Managing any freshwater source should involve protecting it from depletion and protecting it from pollution.

Groundwater, in particular, deserves special attention when creating the management standards. Not only is most of the available freshwater located under the Earth's surface, but groundwater's unique physical characteristics make it more vulnerable to pollution than surface water. These factors justify heightened standards of protection.

300. *Id.*

301. Knox, *supra* note 297, at 309.

302. *Id.* at 310.

303. Kersten, *supra* note 294, at 200.

304. *Id.*